DPI-IMB-COMP-1303-CW-1

# Benefits of Impact MB® on Compost Nitrogen Content[1]

## Introduction

Bioconversion of organic by-products into commercial grade compost is a sustainable solution to recycling organic wastes and is a rapidly growing industry. Nitrogen (N) is typically the limiting nutrient to growing vegetation in land-based ecosystems; however, manufacturing N fertilizer is an expensive and energy intensive process. During the commercial composting process, N from organic waste is bioconverted from inorganic and unstable organic forms into a stable organic form. Unfortunately, a portion of the N is lost to volatilization in the form of ammonia-N ($NH_3$-N) during this process. Impact MB® is an all-natural technology manufactured from a phytogenic extract that has long been used in multiple agriculture industries to minimize the volatilization of noxious gases and odors (e.g., $NH_3$-N, hydrogen sulfide, etc.). In addition to odor control within the composting industry, one of the functions of Impact MB® is to inhibit the volatilization of N, preventing the formation of $NH_3$-N, leading to a reduction in N loss during the composting process, and thereby increasing the N content of the finished compost product. Thus, the objective of this study was to evaluate the effects of Impact MB® application on the N content of compost under commercial windrow composting conditions.

## Materials and Methods

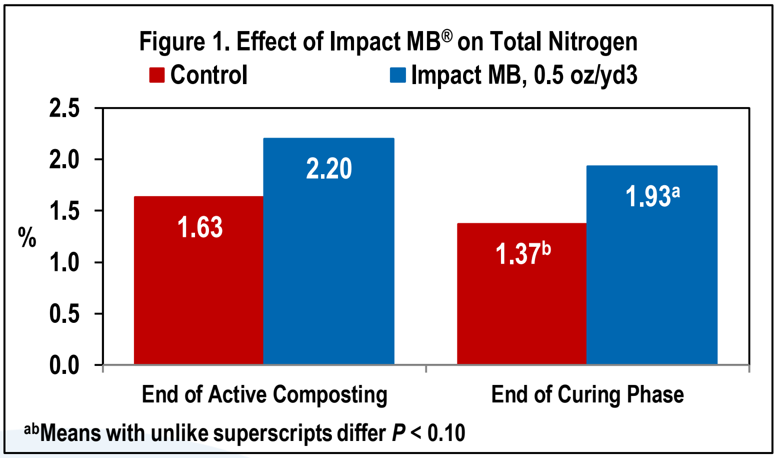
This experiment was conducted in cooperation with a commercial compost manufacturer in Northeast Georgia. One experimental windrow was built with freshly mixed organic feedstocks (yard trimmings and dissolved air flotation (DAF) skimmings at a ratio of 3:1) and physically separated into 6 distinct sub-sections to accommodate the two experimental treatments, each with three replicates. Each windrow replicate was 50 ft. long x 6 ft. high x 17 ft. wide at the base, equating to a volume of 94 cubic yards each. Treatments included: 1) Control (no application of Impact MB®); and 2) Impact MB® applied at 0.5 oz/yd$^3$ of organic media. The Impact MB® treatment was mixed with water to achieve an adequate volume for dispersal and then thoroughly mixed into experimental windrows using a Backhus 17 Series windrow turner. This process was conducted at the beginning of the study (when incoming feedstocks were originally mixed), and again 10 days later.

Compost samples were taken at the end of active composting (6 weeks), and at the end of the curing phase (11 weeks), which followed the manufacturer's normal composting operations. Composite samples were taken from each replicate of each treatment, with a composite sample constituting a mixture of five sub-samples taken from five separate representative areas within each replicated pile. The compost samples were analyzed for: total N (TMECC 4.02-D), ammonium-N (TMECC 4.02-C), nitrate-N (TMECC 4.02-D), pH (TMECC 4.11-A), total carbon (TMECC 4.02-D), organic matter (TMECC 5.07-A), soluble salts (TMECC 4.10-A), and carbon to nitrogen ratio (C:N). All analysis followed the Test Methods for the Examination of Composting and Compost published jointly by the US Composting Council and the US Department of Agriculture (2001). Data generated from the analysis were subjected to statistical analysis for means separation and statistical differences.

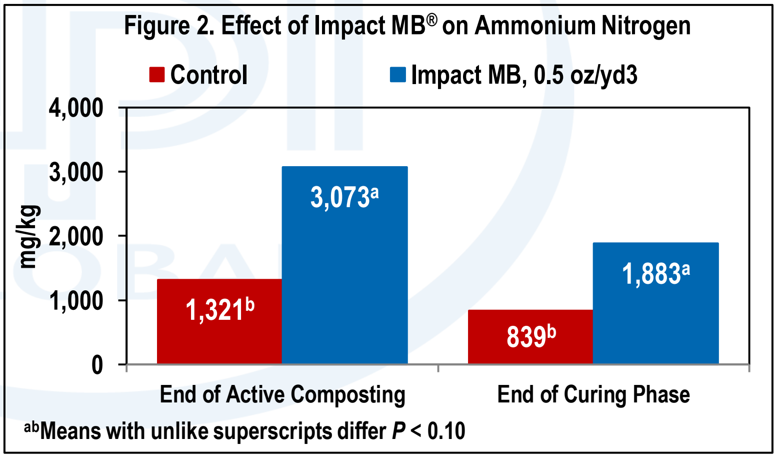
[1] This experiment was conducted by Dr. B. Faucette and J. Governo at Compost Wizard, Decatur, GA 30030, USA.

## Results and Discussion

The effects of Impact MB® application on total N content of compost at both the end of the active composting and curing phase are shown in Figure 1. Impact MB® at 0.5 oz/yd$^3$ was especially effective, increasing the total N content for the active and curing stages by 35 and 41% ($P < 0.10$), respectively. A large increase was also noted in $NH_4$-N due to the application of Impact MB® at 0.5 oz/yd$^3$ at both sampling stages when compared with the Control (active = 133%; curing = 124%). In addition, compost treated with Impact MB® at 0.5 oz/yd$^3$ exhibited a 16% increase ($P < 0.05$) in organic matter at the end of the active phase, relative to the Control (61.0 vs. 52.8%). Finally, with a higher total N content, and particularly $NH_4$-N content, exhibited by the treated compost, it is assumed that the $NH_4$-N will convert to $NO_3$-N as the compost continues to cure, thereby exhibiting higher concentrations of $NO_3$-N (Impact MB® at 0.5 oz/yd$^3$ = 9.5 mg/kg) relative to the Control (18.4 mg/kg).




It is also worthy to note that the pH level tended to be lower (6.8 vs. 7.8; $P < 0.10$) in the compost treated with Impact MB® at 0.5 oz/yd$^3$ at the end of the active stage, relative to the Control, although by the end of the compost curing phase there was no significant difference (7.2 vs. 7.5).




## Conclusions

- These results demonstrate that the addition of Impact MB® to organic materials prior to active composting can increase the nitrogen content of the finished compost. In this experiment, $NH_4$-N in compost was increased by as much as 133% with the addition of Impact MB® relative to the Control compost.
- Although not directly measured in this study, the increase in $NH_4$-N within the treated compost material suggests that Impact MB® will decrease ammonia-N gas emissions (loss), thereby reducing these emissions from commercial composting facilities in a similar fashion as has been proven in other agriculture settings.
- At the end of the composting process, the 0.5 oz/yd$^3$ application of Impact MB® increased total nitrogen of compost by 0.56% (5.6 lb/yd$^3$). Utilizing a current market value for *pure* N fertilizer (anhydrous ammonia) of $1,082/ton ($0.54/lb), this represents an increased N value of $3.02/yd$^3$ over the Control.
- Commercial composters should find a financial benefit to offering a product with an increased N content, and end-users should find greater value in using a higher N content compost product. An increased compost N content can offset N fertilization requirements in garden and crop production, thereby saving the end-user financial expenditures in production and maintenance costs. A byproduct of this phenomenon is less need for N fertilizer production, a highly energy intensive (and carbon intensive) manufacturing process.